Listing of the Claims:

1. (Currently Amended) An electro-thermal field mapping apparatus for scanning a workpiece comprising:

means for generating an optical signal;

an electro-optic field-mapping sensor for receiving the generated optical signal and for generating an output optical signal influenced by a free-space electric field associated with the workpiece passing through an operable range of the sensor;

means for sensing a characteristic of the output optical signal containing electric field information; and

bandgap modulation means for compensating the sensed characteristic of the output optical signal containing electric field information for corruption due to temperature variations.

2. (Original) The apparatus of claim 1 wherein the sensor further comprises:

at least one crystal having a predetermined orientation.

3. (Original) The apparatus of claim 2 further comprising:

the crystal made of gallium arsenide (GaAs).

4. (Original) The apparatus of claim 1 further comprising:

means for scaling relative electric field information to absolute units.

5. (Original) The apparatus of claim 1 further comprising:

means for stabilizing electric field phase drift.

6. (Original) The apparatus of claim 1 further comprising:

means for filtering an electrical signal proportional to the output optical signal so that electric field information and temperature information are distinguishable.

7. (Original) The apparatus of claim 1 further comprising:

means for measuring temperature from the output optical signal.

8. (Original) The apparatus of claim 1 further comprising:

means for simultaneously measuring electric field and temperature from the output optical signal.

9. (Previously Presented) The apparatus of claim 1, wherein the sensing means senses a characteristic of the output optical signal corresponding to a characteristic containing temperature related information.

10. (Currently Amended) A method for scanning a workpiece with an electro-thermal apparatus comprising the steps of:

generating an optical signal;

receiving the generated optical signal and generating an output optical signal with an electro-optic field-mapping sensor influenced by a free-space electric field associated with a workpiece passing through an operable range of the sensor changing a characteristic of the optical signal;

sensing a characteristic of the output optical signal; and

compensating the sensed characteristic of the output optical signal for corruption due to temperature variations with bandgap modulation of at least a portion of the output optical signal.

11. (Original) The method of claim 10 further comprising the step of:

providing the sensor with at least one crystal having a predetermined orientation.

12. (Original) The method of claim 11 further comprising the step of:

providing the crystal made of gallium arsenide (GaAs).

13. (Original) The method of claim 10 further comprising the step of:

scaling relative electric field information to absolute units.

14. (Original) The method of claim 10 further comprising the step of:

stabilizing electric field phase drift.

15. (Original) The method of claim 10 further comprising the step of:

filtering an electrical signal proportional to the output optical signal so that electric field information and temperature information are distinguishable.

16. (Original) The method of claim 10 further comprising the step of:

measuring temperature from the output optical signal.

17. (Original) The method of claim 10 further comprising the step of:

simultaneously measuring electric field and temperature.

18. (Previously Presented) The method of claim 10, wherein the sensing step further comprises the step of:

sensing a characteristic of the output optical signal that contains temperature related information.

19. (Currently Amended) An electro-thermal field mapping apparatus for scanning a workpiece comprising:

means for generating an optical signal;

an electro-optic field-mapping sensor for receiving the generated optical signal and for generating an output optical signal influenced by an electric field associated with the workpiece passing through an operable range of the sensor;

means for sensing a characteristic of the output optical signal containing electric field magnitude and phase information; and

means for deriving the sensed characteristic independent of temperature variations.

20. (Currently Amended) The apparatus of claim 19, wherein the deriving means further comprises compensating a portion of the output optical signal containing information ~~related to~~ about the electric field ~~based on~~ with another portion of the output optical signal containing information ~~related to~~ about temperature.

21. (Currently Amended) The apparatus of claim 19, wherein the deriving means further comprises compensating for temperature variations with a value ~~associated with~~ corresponding to a function of an attenuation of a portion of the output optical signal ~~excluding~~ independent of another portion of the output optical signal containing information on the electric field to correct a size value of a portion of the output optical signal including information on the electric field.

22. (Currently Amended) The apparatus of claim 19, wherein the electro-optic field-mapping sensor comprises a temperature-dependent

semiconductor probe, and the deriving means comprises compensating for temperature variations ~~based on~~ with bandgap modulation of the output optical signal from the temperature-dependent semiconductor probe.

23. (Previously Presented) The apparatus of claim 22, wherein the electro-optic field-mapping sensor and the temperature-dependent semiconductor probe comprise a gallium arsenide (GaAs) crystal for simultaneously measuring electric field and temperature characteristics.

24. (Previously Presented) The apparatus of claim 19, wherein the output optical signal carries information about both the electric field and temperature at a first modulation frequency component, and carries information about temperature only at a second modulation frequency component, such that the temperature information carried by the second modulation frequency component can be used to compensate for temperature effects on the electric field information carried by the first modulation frequency component.

25. (Previously Presented) The apparatus of claim 24, wherein frequencies below a filter cutoff frequency of a low-pass filter contain information on the electric field to be measured.

26. (Previously Presented) The apparatus of claim 24, wherein frequencies above a filter cutoff frequency of a low-pass filter contain information on both the electric field to be measured and the temperature.

27. (Previously Presented) The apparatus of claim 24, wherein the frequencies above a filter cutoff frequency of a high-pass filter contain information about temperature of the electro-optical, field-mapping sensor only.

28. (Previously Presented) The apparatus of claim 19, wherein the electro-optical field-mapping sensor measures at least one of guided radio frequency signals, free-space radio frequency signals, guided microwave signals, and free-space microwave signals.

29. (Currently Amended) The apparatus of claim 19, wherein the deriving means includes an opto-electronic ~~technique associated~~ function with bandgap modulation in the electro-optical field-mapping sensor used to sense the electrical field magnitude and phase.

30. (Currently Amended) The apparatus of claim 19, wherein the deriving means compensates for temperature variation effects on a first portion of the output optical signal ~~relating to~~ including a combination of electric field and temperature information ~~based on~~ using a measured quantity corresponding to absorption of one other specific portion of the output optical signal ~~relating to~~ including only temperature information.